

Amendments to the Claims:

Please amend claims 13, 31, 39, 40, 45 and 46, cancel claims 14, 35 and 44, and add the following new claims 48-67. Following is a complete listing of the claims pending in the application, as amended:

Claim 1. (Cancelled)

Claim 2. (Previously Presented) A processing apparatus for processing a microelectronic workpiece, comprising:

an in-line metrology unit having a space for receiving a microelectronic workpiece for measuring a condition of a first layer on said microelectronic workpiece and generating a condition signal;

a control, signal-connected to said metrology unit;

a process unit providing a space to receive said microelectronic workpiece and perform a material application process that is controlled by said control;

wherein said condition signal from said metrology unit to said control influences said process;

a non-compliance unit; and

a transport unit positioned to receive the microelectronic workpiece from at least one of the process unit and the in-line metrology unit and move the microelectronic workpiece to the other of the process unit and the in-line metrology unit, wherein said condition signal from the metrology unit influences said control to cause said transport unit to transfer the microelectronic workpiece to said non-compliance unit.

Claim 3. (Previously Presented) A processing apparatus for processing a microelectronic workpiece, comprising:

an in-line metrology unit having a space for receiving a microelectronic workpiece for measuring a condition of a first layer on said microelectronic workpiece and generating a condition signal, the first layer including a seed layer;

a control, signal-connected to said metrology unit;
a process unit providing a space to receive said microelectronic workpiece and perform a material application process that is controlled by said control;
wherein said condition signal from said metrology unit to said control influences said process;
a seed layer enhancement unit; and
a transport unit positioned to receive the microelectronic workpiece from at least one of the process unit and the in-line metrology unit and move the microelectronic workpiece to the other of the process unit and the in-line metrology unit, wherein said condition signal from said metrology unit influences said control to cause said transport unit to transport the microelectronic workpiece to said seed layer enhancement unit.

Claim 4. (Cancelled)

Claim 5. (Previously Presented) A processing apparatus for processing a microelectronic workpiece, comprising:

an in-line metrology unit having a space for receiving a microelectronic workpiece for measuring a condition of a first layer on said microelectronic workpiece and generating a condition signal;

a control, signal-connected to said metrology unit;

a process unit providing a space to receive said microelectronic workpiece and performing a material application process that is controlled by said control, the process unit including an electroplating reactor having at least one anode and a workpiece holder to hold said microelectronic workpiece as cathode;

wherein said process is dependent on the current between said anode and said cathode, said condition signal from said metrology unit to said control influencing said process, said control adjusting said current in response to said condition signal, and wherein said condition signal is representative

of a thickness of a seed layer applied onto said microelectronic workpiece;
and

a transport unit positioned to receive the microelectronic workpiece from at least one of the process unit and the in-line metrology unit and move the microelectronic workpiece to the other of the process unit and the in-line metrology unit.

Claim 6. (Previously Presented) A processing apparatus for processing a microelectronic workpiece, comprising:

an in-line metrology unit having a space for receiving a microelectronic workpiece for measuring a condition of a first layer on said microelectronic workpiece and generating a condition signal;

a control, signal-connected to said metrology unit;

a process unit providing a space to receive said microelectronic workpiece and perform a material application process that is controlled by said control, the process unit including an electroplating reactor having a plurality of anodes and a workpiece holder to hold said microelectronic workpiece as cathode; and

wherein said process is dependent on the current between said anodes and said cathode, said condition signal from said metrology unit to said control influencing said process, said control adjusting said current in response to said condition signal, and wherein said control adjusts current between each anode and said cathode.

Claim 7. (Cancelled)

Claim 8. (Cancelled)

Claim 9. (Cancelled)

Claim 10. (Cancelled)

Claim 11. (Cancelled)

Claim 12. (Previously Presented) A processing apparatus for processing a microelectronic workpiece, comprising:

an in-line metrology unit having a space for receiving a microelectronic workpiece for measuring a condition of a first layer on said microelectronic workpiece and generating a condition signal, the first layer including a photoresist layer just after develop, the condition including a pattern dimension of the photoresist layer;

a control, signal-connected to said metrology unit; and

a process unit providing a space to receive said microelectronic workpiece and perform at least one of a photoresist develop process and a photoresist application process, the at least one process being controlled by said control.

Claim 13. (Currently Amended) A method of processing a microelectronic workpiece, comprising the steps of:

providing two processing tools each of which further processes a microelectronic workpiece in a preselected process and is configured to apply material to the microelectronic workpiece;

moving the microelectronic workpiece from one of the processing tools to an in-line metrology unit;

using the in-line metrology unit, determining a condition of a layer on said microelectronic workpiece; ~~and~~

in response to a signal from the metrology unit, modifying a process parameter in the respective other processing tool;

providing a third processing tool in a preselected process order with respect to the two consecutive processing tools; and

modifying process parameters in said third processing tool in response to said signal from said metrology unit.

Claim 14. (Cancelled)

Claim 15. (Original) The method according to claim 13, wherein said microelectronic workpiece is processed first in said one processing tool and subsequently in said respective other processing tool.

Claim 16. (Original) The method according to claim 13, wherein said microelectronic workpiece is processed first in said respective other processing tool and subsequently in said one processing tool.

Claim 17. (Cancelled)

Claim 18. (Cancelled)

Claim 19. (Cancelled)

Claim 20. (Previously Presented) A processing apparatus for processing a microelectronic workpiece, comprising:

an in-line metrology unit having a space for receiving a microelectronic workpiece and configured to generate condition data in response to a measured condition on said microelectronic workpiece, the measured condition including a seed layer thickness;

a processing unit providing a space to receive a microelectronic workpiece to apply material to said microelectronic workpiece;

a control, signal-connected to said metrology unit and to said processing unit to control said process of said microelectronic workpiece depending on said condition data; and

a transport unit positioned to receive the microelectronic workpiece from at least one of the process unit and the in-line metrology unit and move the microelectronic workpiece to the other of the process unit and the in-line metrology unit.

Claim 21. (Cancelled)

Claim 22. (Cancelled)

Claim 23. (Original) A processing apparatus for processing a microelectronic workpiece, comprising:

a seed layer unit providing a space to receive said microelectronic workpiece to effect deposition of a seed layer on said microelectronic workpiece;

an electrochemical deposition unit providing a space to receive said microelectronic workpiece having said seed layer, to deposit a process layer thereon;

a chemical mechanical polishing tool providing a space to receive said microelectronic workpiece and having a polishing mechanism for removing material from said process layer to form a polished layer;

a metrology unit having a space for receiving a microelectronic workpiece, and arranged to measure a layer thickness on said microelectronic workpiece and to transmit a condition signal;

a control unit, signal-connected to said metrology unit;

wherein said condition signal from said metrology unit causes said control to adjust process parameters in at least one of said seed layer unit, said electrochemical deposition unit, and said chemical mechanical polishing tool.

Claim 24. (Original) The apparatus according to claim 23, wherein said metrology unit measured layer thickness is a thickness of said seed layer.

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Claim 25. (Original) The apparatus according to claim 23, wherein said metrology unit measured layer thickness is a thickness of said process layer.

Claim 26. (Original) The apparatus according to claim 23, wherein said metrology unit measured layer thickness is a thickness of said polished layer.

Claim 27. (Cancelled)

Claim 28. (Cancelled)

Claim 29. (Cancelled)

Claim 30. (Cancelled)

Claim 31. (Currently Amended) An apparatus for processing a microelectronic workpiece, comprising:

a metrology unit having a space for receiving a microelectronic workpiece, the metrology unit being configured to measure a condition of at least one conductive layer of the microelectronic workpiece and generate a condition signal representative of the condition;

an electrochemical processing unit having a plurality of electrodes and a space to receive the microelectronic workpiece, the electrochemical processing unit being configured to apply a conductive material to the at least one conductive layer; and

a control unit operatively coupled between the metrology unit and the electrochemical processing unit to receive the condition signal from the metrology unit and transmit a control signal, the control signal influencing at least one of a manner in which the conductive material is applied to the at least one conductive layer of the microelectronic workpiece and a sequence of processes performed on the microelectronic workpiece, and

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wherein the control unit is operatively coupled to the electrodes to control a current applied to at least one of the electrodes based on the condition signal.

Claim 32. (Previously Presented) The apparatus of claim 31 wherein the at least one conductive layer includes a generally continuous seed layer and wherein the metrology unit is configured to generate a condition signal representative of a thickness of the seed layer.

Claim 33. (Previously Presented) The apparatus of claim 31, further comprising a material deposition unit configured to apply the at least one conductive layer to the microelectronic workpiece.

Claim 34. (Previously Presented) The apparatus of claim 31 wherein the metrology unit is configured to detect a condition of the at least one conductive layer, with the at least one conductive layer applied to the microelectronic workpiece external to the apparatus.

Claim 35. (Cancelled)

Claim 36. (Previously Presented) The apparatus of claim 31 wherein the metrology unit and the electrochemical processing unit are housed in a single tool.

Claim 37. (Previously Presented) The apparatus of claim 31 wherein the metrology unit and the electrochemical processing unit are virtually coupled.

Claim 38. (Previously Presented) The apparatus of claim 31 wherein the metrology unit and the electrochemical processing unit are housed in separate tools.

Claim 39. (Currently Amended) The apparatus of claim 31 wherein the control signal influences a uniformity with which the conductive material is applied.

Claim 40. (Currently Amended) An apparatus for processing a microelectronic workpiece, comprising:

a metrology unit having a space for receiving a microelectronic workpiece, the metrology unit being configured to measure a condition of at least one conductive layer of the microelectronic workpiece and generate a condition signal representative of the condition;

a processing unit having a plurality of electrodes and a space to receive the microelectronic workpiece, the processing unit being configured to perform a process on the at least one conductive layer of the microelectronic workpiece, the process including at least one of a repair process and an enhancement process; and

a control unit operatively coupled between the metrology unit and the electrodes of the processing unit to receive the condition signal from the metrology unit and transmit a control signal to the processing unit to influence at least in part the process performed by the processing unit by controlling a current applied to at least one of the electrodes based on the condition signal.

Claim 41. (Previously Presented) The apparatus of claim 40 wherein the at least one conductive layer includes a generally continuous seed layer and wherein the metrology unit is configured to generate a condition signal representative of a thickness of the seed layer.

Claim 42. (Previously Presented) The apparatus of claim 40, further comprising a material deposition unit configured to apply the at least one conductive layer to the microelectronic workpiece.

Claim 43. (Previously Presented) The apparatus of claim 40 wherein the metrology unit is configured to detect a condition of the at least one conductive layer, with the at least one conductive layer applied to the microelectronic workpiece external to the apparatus.

Claim 44. (Cancelled)

Claim 45 (Currently Amended) The apparatus of claim 40 wherein the metrology unit and the ~~electrochemical~~-processing unit are housed in a single tool.

Claim 46. (Currently Amended) The apparatus of claim 40 wherein the metrology unit and the ~~electrochemical~~-processing unit are virtually coupled.

Claim 47. (Previously Presented) An apparatus for processing microelectronic workpieces, comprising:

a seed layer tool having a seed layer deposition station configured to deposit a first conductive material portion on the microelectronic workpiece, the seed layer tool further having a first metrology station configured to detect a characteristic of the first conductive material portion;

an electrochemical deposition tool having an electrochemical deposition station configured to electrochemically deposit a second conductive material

- portion on the microelectronic workpiece, the electrochemical deposition tool further having a second metrology station configured to detect a characteristic of at least one of the conductive material portions;
- a chemical mechanical polishing tool having a chemical mechanical polishing station configured to remove material from the microelectronic workpiece, the chemical mechanical polishing station further having a third metrology station configured to detect a characteristic of at least one of the conductive material portions; and
- a controller operatively coupled among the first, second and third metrology stations, the seed layer deposition station, the electrochemical deposition station, and the chemical mechanical polishing station to influence a process performed at at least one of the seed layer deposition station, the electrochemical deposition station, and the chemical mechanical polishing station based on a characteristic detected by at least one of the metrology stations.

Claim 48. (New) An apparatus for processing a microelectronic workpiece, comprising:

- a metrology unit having a space for receiving a microelectronic workpiece, the microelectronic workpiece having at least one conductive layer that includes a generally continuous seed layer, the metrology unit being configured to measure a condition of the at least one conductive layer of the microelectronic workpiece and generate a condition signal representative a thickness of the seed layer;
- an electrochemical processing unit having a space to receive the microelectronic workpiece, the electrochemical processing unit being configured to apply a conductive material to the at least one conductive layer; and
- a control unit operatively coupled between the metrology unit and the electrochemical processing unit to receive the condition signal from the metrology unit and transmit a control signal, the control signal influencing

at least one of a manner in which the conductive material is applied to the at least one conductive layer of the microelectronic workpiece and a sequence of processes performed on the microelectronic workpiece.

Claim 49. (New) The apparatus of claim 48, further comprising a material deposition unit configured to apply the at least one conductive layer to the microelectronic workpiece.

Claim 50. (New) The apparatus of claim 48 wherein the metrology unit is configured to detect a condition of the at least one conductive layer, with the at least one conductive layer applied to the microelectronic workpiece external to the apparatus.

Claim 51. (New) The apparatus of claim 48 wherein the electrochemical processing unit has a plurality of electrodes and wherein the control unit is operatively coupled to the electrodes to control a current applied to at least one of the electrodes based on the condition signal.

Claim 52. (New) The apparatus of claim 48 wherein the metrology unit and the electrochemical processing unit are housed in a single tool.

Claim 53. (New) The apparatus of claim 48 wherein the metrology unit and the electrochemical processing unit are virtually coupled.

Claim 54. (New) The apparatus of claim 48 wherein the metrology unit and the electrochemical processing unit are housed in separate tools.

Claim 55. (New) The apparatus of claim 48 wherein the control signal influences a uniformity with which the conductive material is applied.

Claim 56. (New) An apparatus for processing a microelectronic workpiece, comprising:

- a metrology unit having a space for receiving a microelectronic workpiece, the microelectronic workpiece having at least one conductive layer that includes a generally continuous seed layer, the metrology unit being configured to measure a condition of the at least one conductive layer of the microelectronic workpiece and generate a condition signal representative a thickness of the seed layer;
- a processing unit having a space to receive the microelectronic workpiece, the processing unit being configured to perform a process on the at least one conductive layer of the microelectronic workpiece, the process including at least one of a repair process and an enhancement process; and
- a control unit operatively coupled between the metrology unit and the processing unit to receive the condition signal from the metrology unit and transmit a control signal to the processing unit to influence at least in part the process performed by the processing unit.

Claim 57. (New) The apparatus of claim 56, further comprising a material deposition unit configured to apply the at least one conductive layer to the microelectronic workpiece.

Claim 58. (New) The apparatus of claim 56 wherein the metrology unit is configured to detect a condition of the at least one conductive layer, with the at least one conductive layer applied to the microelectronic workpiece external to the apparatus.

Claim 59. (New) The apparatus of claim 56 wherein the electrochemical processing unit has a plurality of electrodes and wherein the control unit is operatively coupled to the electrodes to control a current applied to at least one of the electrodes based on the condition signal.

Claim 60. (New) The apparatus of claim 56 wherein the metrology unit and the processing unit are housed in a single tool.

Claim 61. (New) The apparatus of claim 56 wherein the metrology unit and the processing unit are virtually coupled.

Claim 62. (New) An apparatus for processing a microelectronic workpiece, comprising:

- a metrology unit having a space for receiving a microelectronic workpiece, the metrology unit being configured to measure a condition of at least one conductive layer of the microelectronic workpiece and generate a condition signal representative of the condition;

- a processing unit having a space to receive the microelectronic workpiece, the processing unit being configured to perform a process on the at least one conductive layer of the microelectronic workpiece, the process including at least one of a repair process and an enhancement process, the processing unit and the metrology unit being housed in a single tool; and

- a control unit operatively coupled between the metrology unit and the processing unit to receive the condition signal from the metrology unit and transmit a control signal to the processing unit to influence at least in part the process performed by the processing unit.

Claim 63. (New) The apparatus of claim 62 wherein the at least one conductive layer includes a generally continuous seed layer and wherein the metrology unit is configured to generate a condition signal representative of a thickness of the seed layer.

Claim 64. (New) The apparatus of claim 62, further comprising a material deposition unit configured to apply the at least one conductive layer to the microelectronic workpiece.

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Claim 65. (New) The apparatus of claim 62 wherein the metrology unit is configured to detect a condition of the at least one conductive layer, with the at least one conductive layer applied to the microelectronic workpiece external to the apparatus.

Claim 66. (New) The apparatus of claim 62 wherein the electrochemical processing unit has a plurality of electrodes and wherein the control unit is operatively coupled to the electrodes to control a current applied to at least one of the electrodes based on the condition signal.

Claim 67. (New) The apparatus of claim 62 wherein the metrology unit and the electrochemical processing unit are virtually coupled.